Robert Y. Lewis

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Employment

2021 – Present **Brown University**, Providence, RI, USA
Assistant Teaching Professor, Computer Science

2018 – 2021 **Vrije Universiteit Amsterdam**, The Netherlands
Postdoc, Theoretical Computer Science

Summer 2016 **Wolfram Research**, Champaign, IL, USA
Intern, Mathematica Algorithms R&D

2010 – 2012 **St. Agnes Academy**, Houston, TX, USA
Secondary School Teacher
10th grade geometry, 11th and 12th grade pre-calculus, 12th grade AP Calculus AB

Education

2012 – 2018 **Carnegie Mellon University**, Pittsburgh, PA, USA
PhD, Pure and Applied Logic, 2018
MS, Mathematics, 2015
MS, Logic, Computation, and Methodology, 2014

Summer 2015 **University of Newcastle**, NSW, Australia
Visiting student, CARMA Priority Research Centre

2006 – 2010 **Rice University**, Houston, TX, USA
BA, Mathematics and Philosophy

Peer Reviewed Publications

Formalized functional analysis with semilinear maps (journal version)
Frédéric Dupuis, Robert Y. Lewis, and Heather Macbeth
Journal of Automated Reasoning 68, 2024.

Formalized functional analysis with semilinear maps
Frédéric Dupuis, Robert Y. Lewis, and Heather Macbeth
Interactive Theorem Proving (ITP 2022)

A bi-directional extensible interface between Lean and Mathematica
Robert Y. Lewis and Minchao Wu
Journal of Automated Reasoning 66(1), 2022

Formalizing the ring of Witt vectors
Johan Commelin and Robert Y. Lewis
10th ACM SIGPLAN International Conference on Certified Programs and Proofs (CPP 2021)

Normalizing casts and coercions
Robert Y. Lewis and Paul-Nicolas Madelaine
Practical Aspects of Automated Reasoning (PAAR 2020)

Maintaining a library of formal mathematics
Floris van Doorn, Gabriel Ebner, and Robert Y. Lewis
13th Conference on Intelligent Computer Mathematics (CICM 2020)

The Lean mathematical library
The mathlib Community
9th ACM SIGPLAN International Conference on Certified Programs and Proofs (CPP 2020), pp. 367-381. 2020
This paper describes a collective project with many contributors. I am a maintainer of the project and wrote much of this paper.

Formalizing the solution to the cap set problem
Sander Dahmen, Johannes Hölzl, and Robert Y. Lewis
Interactive Theorem Proving (ITP 2019)

A formal proof of Hensel's lemma over the *p*-adic integers
Robert Y. Lewis
8th ACM SIGPLAN International Conference on Certified Programs and Proofs (CPP 2019)

An extensible ad hoc interface between Lean and Mathematica
Robert Y. Lewis
Proof eXchange for Theorem Proving 2017 (EPTCS)

A heuristic prover for real inequalities (journal version)
Jeremy Avigad, Robert Y. Lewis, and Cody Roux
Journal of Automated Reasoning 56(3), pp. 367-386. 2016

A heuristic prover for real inequalities
Jeremy Avigad, Robert Y. Lewis, and Cody Roux
Interactive Theorem Proving (ITP 2014)

Energy-minimizing unit vector fields
Leobardo Rosales, Robert Y. Lewis, et al
Involve 3(4), pp. 435-450. 2010

Other Publications

The art of formal proof
Robert Y. Lewis
Math Horizons 32(2), pp. 20–23. 2024

Logic and Proof (a textbook using the Lean theorem prover)
Jeremy Avigad, Robert Y. Lewis, and Floris van Doorn
Available freely in interactive and static versions

Classification of one-dimensional isocrystals (blog post)
Robert Y. Lewis and Heather Macbeth
Featured on the leanprover-community blog

Two Tools for Formalizing Mathematical Proofs (dissertation)
Robert Y. Lewis
Certified Feb 16, 2018

Polya: A Heuristic Procedure for Reasoning with Real Inequalities (MSc thesis)
Robert Y. Lewis
Certified Dec 11, 2014

Teaching

Brown:
CSCI 0220: Discrete Structures and Probability: S25, S24, S23, S22
CSCI 1715: Formal Proof and Verification (formerly CSCI 1951x): F25, F24, F23, F22, F21
CSCI 1260: Compilers and Program Analysis: F25, F24, F23, F22
CSCI 1970: Independent Study on Homotopy Type Theory: S24
CSCI 1970: Independent Study on Formal Theorem Proving: S22
CSCI 0112: Computing Foundations: Program Organization: F21

VU Amsterdam:
Logic and Modeling: S21 (online), S20 (online), S19, S18 (teaching assistant)
Introduction to Computer Science (theory week): F20 (online)

Carnegie Mellon:
80-211: Logic and Mathematical Inquiry: F16
80-110: Nature of Mathematical Reasoning: S15, Su14
21-257: Models and Methods of Optimization: F14 (teaching assistant)
80-311: Undecidability and Incompleteness: S14 (grader)
80-610: Formal Logic: F13 (grader)

Previous:
Geometry, Pre-calculus, AP Calculus AB: St. Agnes Academy, 2010-2012
Honors Calculus III/IV, **Honors Linear Algebra**: Rice, 2007-2010 (grader)

Student Supervision

Brown, PhD:

2024 –	Eric Zhao

Brown, MSc thesis:

2023	Jakob Kreuze
2022 – 2023	Benjamin Ryjikov

Brown, BSc honors thesis:

2024	Shreyas Mishra (second reader)
2023 – 2024	Jiahua Chen
2023 – 2024	Joseph Rotella
2022	Mark Lavrentyev

Brown, research assistant:

2025	Zachary Quitkin
2024	Aren Guralp, Sophie Ljung
2023	Luke West

VU Amsterdam:

2021	Polina Boneva (BSc thesis)
2019	Kevin Kappelmann, Paul-Nicolas Madelaine (MSc intern)
2018 – 2019	Markos Dermitzakis (BSc thesis), Phillip Lippe (MSc research assistant), Miko Kuijn (MSc thesis)
2018	Pablo Le Hénaff (MSc intern)

Awards, Grants, and Honors

2024	NSF FMitF Track III: *Proof assistants in discrete mathematics education*
2022	NSF SHF Small: *Misconceptions in Understanding Logics and Formal Properties* (co-PI)
2022	Microsoft Research curriculum development grant
2021	Lorentz Center, hosting and organization for 45 person workshop
2020	Microsoft Research on Azure grant
2019 – 2023	Senior Collaborator, Lean Forward NWO Vidi grant
2017	Laboratory of Symbolic and Educational Computation research fellowship
2017	Future Faculty, Eberly Center for Teaching Excellence & Educational Innovation
2015 – 2016	William S. Dietrich II Presidential PhD Fellowship
2014	Honorable Mention, NSF Graduate Research Fellowship Program

Service

2024 –	Founder and managing editor, *Annals of Formalized Mathematics*
2024 –	Brown CS MSc admissions committee
2024	Organizer, Lean Together 2024 workshop
2023 –	Founding member, Lean Prover Community admin team
2023	Organizer, Machine-Checked Mathematics workshop
2022	Organizer, Machine-Checked Mathematics (online) workshop
2021	Organizer, Lean Together 2021 workshop
2020	Proposal assessor, NWO Open Domain Science – XS scheme
2020	Organizer, Formal Methods in Mathematics / Lean Together 2020 workshop
2019 –	Maintainer, Lean mathlib library
2019	Organizer, Lean Together 2019 workshop
2018	Organizer, ICMS session on Formal and Informal Mathematical Corpora
2015, 2016	CMU Philosophy Dept. graduate admissions committee
2015	CMU Philosophy Dept. 30th Anniversary Conference planning committee
2014 – 2018	Founding member, CMU chapter of Minorities and Philosophy
2013 – 2017	Organizer, CMU Philosophy Dept. Graduate Research Sharing Forum
2011 – 2012	Coach and sponsor, St. Agnes Academy Engineering/Robotics Team
2008 – 2010	Coordinator and tutor, SRC Society of Academic Fellows, Rice University

Program committees: Interactive Theorem Proving 2025, SC^2 2025, Certified Programs and Proofs 2025, Interactive Theorem Proving 2024, Formal Mathematics for Mathematicians 2023, Conference on Intelligent Computer Mathematics 2022, SC^2 2022, Certified Programs and Proofs 2021, Artificial Intelligence and Symbolic Computation 2018

Selected Presentations

The "what" and "why" of formal proof

- Brown University Dept of Mathematics seminar, Providence, RI, USA. 04/2024.

Teaching Lean vs. teaching with Lean

- Hausdorff Institute of Mathematics, Bonn, Germany. 06/2024.
- Learning Mathematics with Lean, virtual. 05/2023.
- Rutgers University Lean seminar, New Brunswick, NJ, USA. 05/2023.

The formal language of mathematics

- SUMS 2023, Providence, RI, USA. 03/2023.

Teaching the theory and practice of proof assistants with Lean

- Formal Methods in Education tutorial series, virtual. 08/2022.

Computer algebra and automation in Lean's mathematics library (invited talk)

- Satisfiability Checking and Symbolic Computation, Haifa, Israel. 08/2022.

Software development meets math: Lean and its mathematical library

- Boston University POPV seminar, Boston, MA, USA. 05/2022.

Metaprogramming and tactic writing and **Dealing with numbers**

- Lean for the Curious Mathematician, virtual. 07/2020.

Simplifying casts and coercions

- PAAR 2020: Practical Aspects of Automated Reasoning, virtual. 06/2020.

The Lean mathematical library

- CPP 2020: Certified Programs and Proofs, New Orleans, LA, USA. 01/2020.

Formalizing the solution to the cap set problem

- ITP 2019: Interactive Theorem Proving, Portland, OR, USA. 09/2019.
- Vietnam-USA Joint Mathematical Meeting, Quy Nhon, Vietnam. 06/2019.
- CARMA Workshop on Computer-Aided Proof, Newcastle, NSW, Australia. 06/2019. (Invited speaker.)

A formal proof of Hensel's lemma over the *p*-adic integers

- CPP 2019: Certified Programs and Proofs, Cascais, Portugal. 01/2019.
- Lean Together 2019, Amsterdam, The Netherlands. 01/2019.

A heuristic method for formally verifying real inequalities

- Matryoshka 2018, Amsterdam, The Netherlands. 06/2018.
- Hales60, Pittsburgh, PA, USA. 06/2018. (Invited speaker.)

Toward AI for Lean, via metaprogramming

- AITP 2018: Artificial Intelligence in Theorem Proving, Aussois, France. 03/2018.

The Lean theorem prover, for mathematicians

- Western University Mathematics Dept. Foundations Seminar, London, ON, Canada. 12/2017.

An extensible ad hoc interface between Lean and Mathematica

- ICMS 2018: International Congress on Mathematical Software, South Bend, IN, USA. 07/2018.
- PxTP 2017: Proof eXchange for Theorem Proving, Brasília, Brazil. 09/2017.
- Wolfram Technology Conference, Champaign, IL, USA. 10/2016.

Automation and computation in the Lean theorem prover

- HaTT: Hammers for Type Theory, IJCAR, Coimbra, Portugal. 07/2016.
- AITP 2016: Artificial Intelligence in Theorem Proving, Obergurgl, Austria. 04/2016.
- TU München Logic and Verification Seminar, Munich, Germany. 03/2016.

Algebra and analysis in the Lean theorem prover

- MAP 2016: Effective Analysis, Marseille, France. 01/2016.

Dependent types and the algebraic hierarchy

- Workshop on Mathematics and Computation, Newcastle, NSW, Australia. 06/2015.

A heuristic prover for real inequalities

- ITP 2014: Interactive Theorem Proving, Vienna, Austria. 07/2014.
- 6th Podlasie Conference on Mathematics, Bialystok, Poland. 07/2014.
- CMU Graduate Research Sharing Forum, Pittsburgh, PA. 12/2013.

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